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TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No. ITL.0100P1US

In Re Application Of: **Dennis M. O'Connor and Mark P. Chuang**

Serial No.	Filing Date	Examiner	Group Art Unit
09/150,577	September 10, 1998	R. Chevalier	2615

Invention: **Time Shifting By Simultaneously Recording and Playing a Data Stream**

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TO THE ASSISTANT COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on **September 25, 2002.**

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Dated: **November 1, 2002**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant:			
	Dennis M. O'Connor et al.	Art Unit:	2615
Serial No.:	09/150,577	Examiner:	R. Chevalier
Filed:	September 10, 1998		
For:	Time Shifting By Simultaneously Recording and Playing a Data Stream	Atty Docket:	ITL.0100P1US P4575X

Board of Patent Appeals & Interferences
Commissioner for Patents
Washington, D.C. 20231

APPEAL BRIEF

Sir:

Applicants respectfully appeal from the final rejection mailed July 22, 2002.

I. REAL PARTY IN INTEREST

The real party in interest is the assignee Intel Corporation.

II. RELATED APPEALS AND INTERFERENCES

This is related to Appeal No. 2000-1762, decided July 31, 2002.

III. STATUS OF THE CLAIMS

Claims 1-5, 11, 13, 14, 16, 17, 20, 21, 23, and 24 are rejected. Each rejection is appealed.

Claims 12 and 15 are only objected to as depending from a rejected claim.

Date of Deposit: November 1, 2002
I hereby certify under 37 CFR 1.8(a) that this correspondence is being deposited with the United States Postal Service as **first class mail** with sufficient postage on the date indicated above and is addressed to the Commissioner for Patents, Washington, DC 20231.

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IV. STATUS OF AMENDMENTS

All amendments have been entered.

V. SUMMARY OF THE INVENTION

Figure 1 shows a block diagram of a video record and playback system 100 in accordance with one embodiment of the invention. A video stream is received at the video input 102. The video stream is stored in the storage unit 108. A buffer unit 106 may be used as temporary storage for providing larger sequential blocks of video data to the storage unit 108. In one embodiment, the storage unit 108 is a random access memory that allows relatively quick access to any portion of the stored video stream. A hard disk is an example of a random access memory. See specification at page 3, line 24 through page 4, line 19.

Figure 2 shows a flow chart of the method of providing a time-shifted video stream. The flow chart begins at block 200, and continues at block 202 where the video stream is received. The recording of the video stream begins at block 204. At block 206, playback of the recorded video stream is performed by retrieving a portion of the video stream from the random access storage unit while the recording of the incoming video stream continues. The retrieved portion of the video stream may be time-shifted from the incoming video stream by a time delay. At block 208, the portion of the video stream retrieved from the random access storage unit is retrieved for display by a television or other display device. See specification at page 4, line 20 through page 5, line 26.

In this way, the record and playback functions are decoupled from one another. The user may now begin watching a recorded TV show from the beginning, i.e., prior to the show being completely recorded.

Figure 3 shows one method for retrieving a portion of the video stream from the random access storage unit while continuing to record the incoming video stream. In the disclosed embodiment, the simultaneous recording and playback of the video stream is performed by multiplexing or alternately storing the video stream to the random access storage unit and reading of the video stream from the random access storage unit. The multiplexed or alternated stores and reads may occur quickly enough that the user does not notice an appreciable delay in the playback of the video stream, and the incoming video stream is not lost, i.e., all of the video stream is recorded. Thus, the record and playback are simultaneous from the user's point of view.

In one embodiment, the random access storage unit is a hard disk. The retrieval of the time-shifted video signal from the hard disk is performed at a first physical location (or sector) of the hard disk, and the storing to the hard disk of the incoming video stream is performed at a different physical location (or sector) on the hard disk. Because it takes more time to jump back and forth between different sectors of the hard disk than to read and write to sequential locations in the same sector, data may be buffered to minimize the number of accesses to and from the hard disk using buffer 106. This increases the amount of data transferred per access. See specification at page 5, line 27 through page 6, line 29.

In block 302, the video stream is stored in a random access storage unit. The video stream is optionally compressed and/or buffered prior to storage. In block 304, the video stream is retrieved from the random access storage unit. Buffering and/or decompression may be performed before providing the retrieved video stream to the video output port 120.

The next portion of the video stream is stored (block 306) as described in block 302. At block 308, the next portion of the video stream is retrieved as described in block 304. This process is repeated until either the recording or playback cycle is terminated.

Figure 4 shows one embodiment of an apparatus for storing the video stream in the storage unit 108. In this embodiment, the video stream is stored as separate files 001 and 009 on a hard disk, for example. The processor 130 keeps track of the file and offset into the file of the data being played back, as well as the file and offset into the file of the data being recorded. If the random access storage unit is fast enough, more than one video stream can be recorded and played back at the same time.

Due to the nature of the random access storage unit being capable of easily recording over itself, the random access storage unit may act as a temporary buffer for recording the latest portion, or X number of minutes, of an incoming video stream, where X is set up based upon the size of the storage unit. In one embodiment, X could be set up to be the entire storage unit. As newer portions of the video stream are received, they overwrite the older portions of the video stream saved in the random access storage unit. In this manner, the temporary buffering of the video stream acts as a circular buffer. In one embodiment, the processor 130 maintains pointers to the beginning and ending points of the temporary buffer. The processor 130 reassigns the pointers as newer portions of the video stream are received and/or older portions of the video stream are overwritten. See specification at page 7, line 1 through page 8, line 7.

Figure 5 shows a flow chart 500 of one method for using the storage unit as a temporary buffer. At block 502, the video stream is received at an input. Recording of the video stream to the storage unit begins at block 504. At block 506, older portions of the video stream are deleted as newer portions of the video stream are stored to the storage unit.

A user may initiate a playback cycle following block 506. For example, this may occur when the user wishes to re-view a video clip that he just saw. In one embodiment, the user stops recording to the temporary buffer and plays back the last portion of the temporary buffer.

However, it may be more desirable to the user to be able to continue recording as shown at block 508. A record and playback cycle (as described with respect to Figure 2) is started, in which the incoming video stream is recorded while the user re-views the last portion of the temporary buffer. In this manner, after re-viewing the desired video clip, the user can resume sequentially watching the video stream from the point of the video clip.

At block 510, after the record and playback cycle is completed, all or part of the temporary buffer may be saved. Since the temporary buffer stores the latest X minutes of the video stream prior to the record and playback cycle, all or part of the temporary buffer may be allocated to the portion of the video stream saved during the record and playback cycle. Other portions of the video stream may then be deleted from the storage unit, or they may be marked as overwriteable and used as a new temporary buffer. See specification at page 8, line 8 through page 9, line 7.

Figure 6 illustrates a method for playing back a video stream to allow the playback to catch up to the incoming video stream. Usually, during simultaneous playback and recording of the same video stream, the playback of the video stream is time-shifted from the incoming video stream by a time delay. However, if the playback is performed at an overall rate faster than the rate at which the incoming video stream is received, then the playback will catch up to the incoming video stream.

For example, playback of the video stream may have an overall rate faster than the rate of the incoming video stream if the playback is fast forwarded, or if segments of the playback are

skipped altogether. When the time delay of the time-shifted video stream being played back falls below a certain threshold, the video and playback system 100 will cease providing the time-shifted video stream from the storage unit. Instead, the incoming video stream will be provided to the video output port 120 directly. In one embodiment, a bypass 142, as shown in Figure 1, allows the incoming video stream to be provided to the video output port 120 directly.

When this happens, the user has caught up to the "live" broadcast, i.e., the incoming video stream. The user may terminate the recording cycle, if he wishes. Alternatively, the user can put the video record and playback system 100 back into the temporary buffering mode in which only the latest portion of the video stream is stored.

Referring next to Figure 12, a program 1020 called display is used to control various features implemented by the computer 1000. Initially a check is made at diamond 1200 to determine if an electronic programming guide (EPG) is implemented. An electronic programming guide is an electronic depiction of the various programs that are available at different times. The electronic programming guide can be provided on a disk, over a modem, by an Internet connection and using an interactive broadcasting transmission such as Intercast® 2.0 interactive broadcasting software available from Intel Corporation.

Continuing in Figure 12, an inquiry (diamond 1206) checks whether the user has selected the zoom feature for playback. If the user presses a zoom button during playback, a zoom feature is implemented. In one embodiment, five predefined quadrants in the television display may be defined including four quadrants located peripherally around a central quadrant. When the user selects the zoom feature the user indicates the appropriate quadrant for the zoom (block 1208). The selected quadrant is scaled (block 1210) to produce a larger (zoom) picture.

Referring to block 1208, the pointer focus is identified to determine which quadrant will be zoomed. That quadrant is then scaled as indicated at block 1210. Because the television program is continually being stored, the scaling can be implemented without any loss of continuity of the television picture. After the user has completed looking at the zoomed depiction, the user can return to the program at the point where he or she departed to view the zoomed depiction. Thereafter the displayed depiction viewed by the user may be time delayed from the actually broadcast program. However the user is able to view the program in its entirety even if slightly time delayed.

The zoom function 1312 may be implemented as a four-way rocker switch. A zoom is implemented for the top quadrant of a display by pressing the upper edge of the button. If the button is pressed in the middle, the center quadrant is chosen for zoom. Likewise any of the remaining three edges of the zoom button can be operated to select a desired quadrant for zoom features. See specification at page 17, line 17 through page 18, line 14.

Techniques for storing the video stream onto the storage device 1410 and for reading the information out of the storage device are summarized in Table 1 below and illustrated in Figures 14, 15, and 16. In Figure 14, a schematic depiction of the storage system 1400 includes a digital storage device such as a hard disk drive 1410. The digitized video 1402 is initially stored in a buffer which is designated as being currently on the top of the memory stack. The transfer of information between the buffers and the storage device 1410 may be done in discrete time

	Time Steps								
Buffers	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Input	1404	1408	1406	1404	1408	1406	1404	1408	1406
Storage									
Read	X	X	X	1412 1414	X	1414 1416	X	1412 1416	X
Write	X	X	1404 1408	X	1404 1406	X	1406 1408	X	1404 1408
Output	X	X	X	X	1414	1412	1416	1414	1412

Table 1 (X = no action)

periods referred to herein as time steps. In a first time step, shown in Figure 15, the digitized video 1402 (Figure 14) is stored in memory buffer 1404 because that buffer is currently at the top of the memory stack, as indicated in block 1502 in Figure 15. See specification at page 18, line 15 through page 19, line 15.

As the buffer 1404 fills up, the buffer 1408 moves to the top of the stack (as indicated by the dashed arrow) and incoming video is stored in buffer 1408. As indicated in block 1504 in Figure 15 in time step 2, the buffer 1408 replaces the buffer 1404 as the designated top of the stack buffer. The next input video is then stored in the new buffer (1408) as indicated in block 1506.

In time step 3 the buffer 1408 has filled up and the contents of buffers 1404 and 1408 are written to the storage device 1410 in a single write operation. During the same time step, buffer 1406 moves to the top of the stack and becomes the storage buffer for incoming video. This is illustrated in blocks 1508, 1510 and 1512 in Figure 15.

In time step 4, the buffer 1404 moves back to the top of the stack to store incoming video since its previous content has already been saved in the storage device 1410. This is indicated in block 1514 of Figure 15, and in Figure 16 in block 1602. The storing of incoming information, as illustrated in Figure 15 then cycles back to the top of the flow in Figure 15 and continues in the same fashion thereafter.

The content from the storage device 1412 is then read into buffers 1412 and 1414.

In time step 5, the buffer 1408 moves to the top of the stack to store incoming video, and buffer 1414 moves to the top of the output stack and transfers data to the video output 1418. The contents of the buffers 1404 and 1406 are then written to the storage device 1410.

The time steps 1 to 5 illustrate a complete cycle from input to output. The remaining sequence of steps repeat starting at step 5 for the input of data and time steps 6 through 9 repeat for the output of data. See specification at page 19, line 16 through page 20, line 23.

Referring now solely to Figures 14 and 16, in time step 6, information stored in the storage device is read to the sixth and fourth buffers (i.e., buffers 1414 and 1416) as indicated in block 1606. The contents of the fifth buffer (1412) are sent to the output 1418.

In time step 7, the contents of the sixth buffer (which is buffer 1416) are sent to the output 1418. No other output operations occur.

In time step 8, the contents from the storage device 1410 are read into the fifth and sixth buffers (buffers 1412 and 1416) as indicated in block 1612. Also the contents of the fourth buffer (buffer 1414) are passed to the output 1418 as indicated in block 1614.

Finally, during time step 9 the contents of the fourth buffer (buffer 1412) are passed to the output 1418, completing the cycle.

Using these algorithms, the storage device is provided with enough time, through the operation of the buffers, to write the incoming video while supplying enough data simultaneously to the output display. Since the memory is used to make sure no content is dropped at the input end and the display is never starved at the output end, continuous, even display can be provided without losing information. In addition reading and writing larger chunks of data at one time minimizes the amount of storage device head movement, thereby allowing the storage device to keep up with the read and write requests. See specification at page 20, line 24 through page 21, line 22.

The minimum size of the individual buffers 1404 to 1408 and 1412 to 1416 ("B") is dependent on a number of factors including the input/output data rate "D", for example in megabytes per second, the effective bandwidth of the storage device when reading or writing "S", for example in megabytes per second, and the average seek time for the storage device per transaction "t", in microseconds. The time that it takes to fill up one memory buffer (B divided by D) is advantageously greater than the time it takes to read or write two memory buffers (2B divided by S) plus the average seek time (t):

$$\left(\frac{B}{D}\right) \geq \left(\frac{2B}{S}\right) + \left(\frac{t}{1000}\right)$$

Solving for the minimum buffer size in the above equation yields the following equation which gives the minimum buffer size:

$$B \geq ((DS)/(S-2D))/(t/1000)$$

Thus, a method of simultaneously recording and playing back a time-shifted video stream is disclosed. The specific arrangements and methods described herein are merely illustrative of the principles of this invention. For example, the same method may be used to store and retrieve other types of data streams besides video streams. Numerous modifications in form and detail

may be made without departing from the scope of the described invention. Although this invention has been shown in relation to a particular embodiment, it should not be considered so limited. Rather, the described invention is limited only by the scope of the appended claims. See specification at page 22, line 24 through page 23, line 26.

VI. ISSUES

A. Is Claim 1 Obvious Over Gould and Sata?

B. Is Claim 11 Obvious Over Sata in View of Honjo?

C. Is Claim 21 Obvious Over Sata in View of Honjo?

VII. GROUPING OF THE CLAIMS

For convenience on appeal, claims 2-5, 16, and 17 may be grouped with claim 1; claims 13, 14, and 20 may be grouped with claim 11; and claims 23 and 24 may be grouped with claim 21.

VIII. ARGUMENT

A. Is Claim 1 Obvious Over Gould and Sata?

With respect to claim 1, the combination of Sata plus Gould still does not meet all the claim elements. Claim 1 calls for providing a zoom function "so that the second portion" (i.e., the portion being read from the storage medium while the first portion is being written) may be scaled for implementing the zoom function while the first portion of the video stream is being written. The claim specifically calls for scaling the second portion while the first portion is being written.

It is believed that the Examiner agrees that Sata does not teach any type of zoom function. And even if the Examiner's correct that Gould teaches a zoom function, Gould does not teach doing the zoom function on the second portion while the first portion of the video stream is being written. In other words, claim 1 calls for doing the zoom function, not at any time, as suggested by Gould, but at a specific time with respect to the reading and writing of first and second portions.

Gould is inadequate to provide the teaching of doing the zoom function at the claimed time and Sata never teaches doing a zoom function. Therefore, the combination, even if there were a rationale to combine, is insufficient to support the rejection.

B. Is Claim 11 Obvious Over Sata in View of Honjo?

Claim 11 calls for allowing portions of the video stream to be alternately written to and read from a storage device. In the pending appeal in the parent case, the Board determined that multiplexing reads and writes was not shown in Sata. See Appeal No. 2000-1762 at page 6 ("Appellant argues that there is no teaching of multiplexing in Sata... We agree with Appellant"). The Board's previous determination is res judicata here.

Similarly, claim 20 calls for allowing portions of the video stream to be alternately written to and read from a storage device. Again, in view of the Board's decision with respect to the claims to multiplexing writes and reads, the rejection should be reversed.

C. Is Claim 21 Obvious Over Sata in View of Honjo?

With respect to claim 21, it has now been amended to include its dependent claim 22. It is not believed that claim 22 has ever been specifically addressed in any office action to date.

Similarly, claim 24 has been amended to include the subject matter of claim 25 which has never been addressed.

Therefore, the rejection should be reversed.

IX. CONCLUSION

Applicants respectfully request that each of the final rejections be reversed and that the claims subject to this Appeal be allowed to issue.

Respectfully requested,

Date: November 1, 2002

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APPENDIX OF CLAIMS

The claims on appeal are:

1. A method of allowing a video stream to be displayed and recorded comprising:

allowing a first portion of a video stream to be written to a storage medium while a second portion of a video stream is being read from a storage medium; and

providing a zoom function so that the second portion may be scaled for implementing the zoom function while said first portion of the video stream is being written.

2. The method of claim 1 further including allowing the video stream to be written to a hard disk.

3. The method of claim 1 further including allowing the video stream to be written to a random access media.

4. The method of claim 1 further comprising:

retrieving two or more frames of the video stream shifted by different time delays;

displaying the two or more frames of the video stream; and

allowing a user to select one of the frames of the video stream as a starting point for playing back the video stream.

5. The method of claim 1 further including providing at least two pre-defined screen segments and allowing the user to select one of the two segments to be scaled.

11. A method of enabling a video stream to be stored and displayed at the same time comprising:

allowing portions of the video stream to be alternately written to and read from a storage device; and

storing in a temporary buffer the next portion to be written to the storage device while another portion is being read from said storage device.

12. The method of claim 11 further including displaying a portion of a video stream at least initially delayed by a time delay, wherein when the time delay is greater than a predetermined threshold, displaying the video stream from the storage device and when the time delay is less than the predetermined threshold displaying the video stream without storing said stream.

13. The method of claim 11, further including allowing one or more portions of the video stream to be read from the storage device to retrieve the video stream with one or more time delays that are user-specified.

14. The method of claim 11, wherein allowing the video stream to be written to the storage device further comprises allowing the video stream to be compressed prior to writing the video stream to the storage device.

15. The method of claim 12, wherein allowing portions of the video stream to be displayed from the storage unit when the time delay is greater than the predetermined threshold comprises decompressing the video stream after retrieving the video stream from the storage unit.

16. An article comprising a medium for storing instructions that cause a computer to:

allow a first portion of a video stream to be written while a second portion of a video stream is being read; and

provide a zoom function so that the second portion may be scaled for implementing the zoom function while said first portion of the video stream is being written.

17. The article of claim 16 including instructions that cause a computer to allow the video stream to be written to a random access media.

20. An article comprising a medium for storing instructions that cause a computer to:

allow portions of the video stream to be alternately written to and read from a storage device; and

store in a temporary buffer the next portion to be written to the storage device while another portion is being read from said storage device.

21. A method of reading and writing data from a storage device comprising:

storing data in a plurality of buffers wherein the buffer size is greater than or equal to the time it takes to read or write from two buffers to and from a storage device; and

transferring data from at least two buffers at a time to and from said storage device.

23. The method of claim 21 wherein the buffer size is greater than or equal to the time it takes to read or write from two buffers to or from the storage device plus the average seek time of the storage device per read or write transaction.

24. An article comprising a medium for storing instructions that enable a computer to:

store data in a plurality of buffers, wherein the buffer size is greater than or equal to the time it takes to read or write from two buffers to and from the storage device; and

transfer data from at least two buffers at a time to and from said storage device.